

**REMARKS**

Examination of the application is requested. No additional fees are seen to be required. If any additional fees are due, however, the Commissioner is authorized to charge Deposit Account No. 50-1482, in the name of Carlson, Gaskey & Olds, P.C., for any additional fees or credit the account for any overpayment.

Respectfully Submitted,

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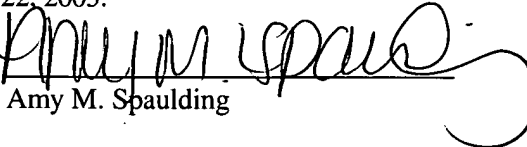
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Dated: April 22, 2005

**CERTIFICATE OF MAIL**

I hereby certify that the enclosed preliminary amendment is being deposited with the United States Postal Service as Express Mail, postage prepaid, in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on April 22, 2005.



Amy M. Spaulding

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Corte et al.  
Serial No.: Herewith  
Filed: Herewith  
Group Art Unit: Unknown  
Examiner: Unknown  
Title: A WHEEL AND A WHEEL DISC

**SUBSTITUTE SPECIFICATION TRANSMITTAL**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

The attached substitute specification includes no new matter. Accordingly a marked-up copy of the substitute specification showing the matter being added to and the matter being deleted from the specification of record has been submitted.

Respectfully submitted,

**CARLSON, GASKEY & OLDS**



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## A WHEEL AND A WHEEL DISC

### REFERENCE TO RELATED APPLICATIONS

The application claims priority to PCT Patent Application No. PCT/BR2003/000146 which was filed on October 9, 2003, which claims priority to Brazilian Patent Application No. PI0204356-4 which was filed on October 23, 2002.

### BACKGROUND OF THE INVENTION

The present invention relates generally to a wheel, preferably a stamped wheel, ~~including comprising a wheel disc having provided with multiple bores that enable the wheel disc for enabling it to be fixed to wheel hubs of various vehicle models, as well as to a wheel disc configured in this way.~~ Description of the Prior Art

The present vehicle market ~~of vehicles is more and more~~ very competitive, which have ~~been causing mergers have caused mergers~~ between large assembly plants to ensure for the purpose of ensuring greater competitiveness and a greater ability to withstand market capacity of standing the pressures of the market. As a result, ~~these novel conglomerates will~~ companies try to minimize, as much far as possible, their costs and to increase ~~the~~ productivity. With regard to the wheels, ~~there it is an increase in the trend~~ preferable to use wheels ~~offrom~~ the same supplier and of the same model for several lines of vehicles.

~~In the specific case of the wheels, there is an aggravating factor, namely the fact that the vehicles of~~ Vehicles made in each assembly plant ~~have use~~ different projects wheels. As already known, a wheel is formed by a rim and a disc, and the disc ~~being is~~ provided with a central portion having at least three through bores for fixing the wheel to a wheel hub and, ~~as a rule,~~ a central bore. The ~~This~~ bores are arranged ~~made~~ concentrically around the central bore, but the diameter (of the circumference) formed from ~~the~~ respective central points of ~~thesaid~~ bores varies from assembly plant to assembly plant.

For example, ~~Let us take as an example of this trend the case of the companies FIAT and General Motors (GM), which have recently associated with each other.~~ For the FIAT, ~~wherein the diameter (of the circumference) formed from the central point of~~ thesaid through bores ~~for fixing that fix~~ the vehicle disc ~~from FIAT is of 98 mm, and the boring wheel disc includes four~~ comprising 4 bores in this case, while the vehicles. Vehicles from GM use

wheels ~~having 4~~including four bores, and a diameter from the central point of the bores is of 100 mm.

However, ~~there are some~~ models of these vehicles and models from other assembly companies ~~that use various other boring configurations of boring~~, which have other diameter values, as well as a different~~larger or smaller~~ number of fixation bores.

~~To In order to solve this problem, one has developed~~ wheels ~~that comprise~~have been developed that include a disc provided with a central portion having various boring configurations of boring, with varying~~that have various~~ diameters and various number of bores. ~~But these proposed solutions also comprise~~These wheels include an adapter positioned so as to overlap~~that overlaps~~ the central portion of the wheel disc, ~~for positioning and fixing that positions and fixes~~ the wheel to the vehicle hub, according to project determinations. This type of wheel is disclosed in U.S. Patent No. US Pat. 3,166, 357.

However, ~~the this~~ wheel ~~in question, which~~ is stamped, and has a ~~smaller~~reduced thickness at the central region of the disc, ~~which enables~~enabling it to be easily stamped, ~~but decrease the~~ The resistance of the wheel fixed to the vehicle decreases, since the through bores are very close to each other. When the wheel is fixed to the vehicle hub, it is subjected to a ~~very~~ great tightening pressure and may be ~~damaged~~damages at ~~that the~~ (those) point(s) where pressure has been applied, due to its thinness. In this ~~particular case, the problem has been solved by means of a~~ thicker adapter ~~that is thicker and that~~ cooperates with the existing thickness existing on the wheel disc has been used to solve this problem, thus increasing the final thickness of the assembly and distributing the load resulting from the tightening of the screws ~~throughout its extent~~.

Brazilian documents PI 9204344-5 and PI 9300987-9, ~~in turn, discloses~~ disclose light alloys cast wheels, which ~~have~~employ the same concept of the wheel presented by ~~the above mentioned US Pat.~~ U.S. Patent No. 3,166, 357. The bores ~~existing~~ in the central portion of the wheel disc ~~are~~ extend radially, and ~~this the central~~ portion receives, in an overlapped manner, an adapter disc provided with a variety of different bores that are compatible with a determined number of automobiles. The three documents cited above use adapters that increase the final cost of the wheel and makes it difficult to fix the wheel to the vehicle hub.

Brazilian Document PI 9203685-6 discloses a wheel made of a light alloy, which ~~includes~~comprises a disc provided with a central portion having eight bores, forming which

~~form~~ two sets of four bores ~~each~~. Each set of bores includes~~comprise~~ four bores arranged concentrically to the central bore of the wheel disc, ~~thus~~ forming a circumference of a particular diameter. In this way, ~~one makes the bores having~~have circumferences of different diameters. However, the wheels of light alloy are manufactured~~of~~ completely different~~different manufacture~~ and are much more expensive ~~and, therefore, they~~. Therefore, these wheels do not originally equip economical and utility vehicles, which limits their penetration into the market and, consequently, their sales~~sale~~ potential. For this reason, ~~they~~these wheels are not easily~~hardly~~ accessible ~~to a public that is not wealthy, since because~~ this type of wheel may be five times as expensive as the stamped-steel wheel.

The wheels made of light alloy are also more expensive ~~because for various reasons, namely: the need for a material that has~~having a higher final cost, as for example aluminum, is needed, and the machining of these materials consumes~~which consumes~~ much electric energy; ~~in order~~. Also, to be casted, the wheel made of light alloy needs more manufacture material than steel wheels to provide additional, ~~so that more strength can be provided for its utilization~~. All these additional costs are ~~end up being~~ passed on to the final consumer, which greatly raises the cost of this type of wheel.

The wheel made of light alloy are made of a technically fragile material, that is, ~~they~~ the material deforms very little and may break after being exposed to~~and~~ a determined strain, ~~after which they merely break, presenting little deformation, while the wheels~~. Wheels of steel deform and, consequently, may prevent an accident; since they collapse to~~by collapsing they prevent an immediate leakage of air out of the tire, thus enabling a less skillful driver to control the vehicle~~. Wheels made ~~In the case of the wheels of light alloy, on the contrary, may burst immediately~~the bursting is immediate.

There are other drawbacks to~~For the user of the stamped steel wheels off from the prior art there is another drawback~~. When ~~a~~the consumer changes the vehicle and intends to ~~continue with them for~~use the wheels with a future ~~change of~~ vehicle, he often ~~can not~~ cannot use the wheels of them on the new vehicle. This occurs ~~since, when the mark and/or model of the new vehicle is different, because~~ the bore diameter of the wheel disc for fixing the wheel disc to the hub ~~is~~can be different from that of the preceding wheel if the vehicle model is different. Therefore, ~~in these cases the consumer can not~~cannot continue to use the same wheels.

Objects of the Invention**SUMMARY OF THE INVENTION**

An object of the present invention is to provide a wheel that is preferably stamped from steel ~~that includes, comprising~~ a wheel rim and a wheel disc associated to each other. The ~~wheel disc is provided with~~ includes a central portion ~~that has~~ having a central bore and at least two sets of fixing bores; which are concentric ~~thereto to the central bore~~. Another objective of the invention is to provide a wheel disc ~~thus configured as described above~~.

Brief Description of the Invention

The objects of the present invention are achieved ~~by means of~~ a wheel, particularly for use on ~~vehicles~~ a vehicle, ~~including~~ comprising a wheel rim and a wheel disc associable to each other; ~~the~~. The wheel disc ~~is being~~ provided with a central portion which ~~includes~~ comprises a region for accommodating ~~the~~ a wheel hub of the vehicle and; around which at least six fixing bores are arranged; ~~wherein~~. The ~~the~~ fixing bores configure at least ~~one~~ a first set of bores that define defining a first circumference ~~that has~~ having a first diameter; and a second set of bores that define defining a second circumference ~~that has~~ having a second diameter different from the first diameter; ~~The~~ the wheel is associated to the wheel hub of the vehicle by direct association of at least three fixing elements with the first set of bores or the second set of bores and through the respective fixing bores.

Also, the objectives of the present invention are achieved ~~by means of~~ a wheel disc, particularly associable to a wheel rim, ~~that forms~~ forming a wheel for use on ~~vehicles~~; ~~provided with~~ a vehicle. The wheel includes a central portion ~~that comprises~~ having a region for accommodating the wheel of the vehicle and; around which at least six fixing bores are arranged; ~~wherein~~. The ~~the~~ fixing bores configure at least ~~one~~ a first set of bores that define defining a first circumference ~~that has~~ having a first diameter; and a second set of bores that define defining a second circumference ~~that has~~ having a second diameter different from the first ~~one~~; ~~the~~ diameter. The disc is directly associable to the wheel hub of the vehicle by direct association of at least three fixing elements with the first set of bores or ~~the~~ and second set of bores and through the respective fixing bores.

The present invention has ~~many~~ the following advantages; ~~among others~~:

1) ~~decrease of~~. For ~~one~~, the ~~area~~ area of the assembly cells in the assembling plant ~~decreases~~; ~~since the different~~ because there are fewer types of wheels to be assembled

~~drastically decrease, thus increasing in the useful~~ the amount of space of the assembling plant ÷

2)- Additionally, logistic are easi~~ease of logistic~~, due to the decrease in the variety of wheels produced÷

3)- Finally, reduction of the cost of wheel-manufacture~~cost, is reduced~~ due to the ~~scale economy~~economies of scale.

#### Brief Description of the Drawing

#### **BRIEF DESCRIPTION OF THE FIGURES**

The present invention will now be described in greater detail with reference to the embodiments presented in the drawings. The figures show:

Figure 1 shows÷ a detail view of ~~at~~the central portion of ~~at~~the wheel disc of a first embodiment of a stamped wheel offrom the prior art;

Figure 2 shows÷ a schematic detail view of the central portion of the wheel disc of the first embodiment of ~~the~~a stamped wheel offrom the prior art;

Figure 3 shows÷ a detail view of the central portion of the wheel disc of a second embodiment of ~~the~~a stamped wheel offrom the prior art;

Figure 4 shows÷ a schematic detail view of the central portion of the wheel disc of a second embodiment of a wheel offrom the prior art;

Figure 5 shows÷ a front view of a first embodiment of the wheel according to the present invention;

Figure 6 shows÷ a schematic view of the central portion of the wheel disc of the first embodiment of the wheel according to the present invention;

Figure 7 shows÷ a detail view of the central portion of the wheel disc of a second embodiment of the wheel according to the present invention; and

Figure 8 shows÷ a detail view of the central portion of the wheel disc of a third embodiment of the wheel according to the present invention.

### Detailed Description of the Figures

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

As ~~shown~~~~can be seen~~ in ~~Figures~~~~figures~~ 1 to 4, ~~the~~ stamped wheels ~~offrom~~ the prior art are configured specifically for ~~specifically meeting the projects of~~ vehicles of each assembly plant ~~and~~. Each stamped wheel includes, ~~therefore, they have~~ a central bore 1' of ~~the~~ wheel disc 3' ~~having, which has~~ a diameter 2a' or 2b' (which will be explained in greater detail below), ~~according to which depends on~~ the type of vehicle on which ~~they~~ the wheel will be used.

Each set of bores ~~includes~~~~comprises~~ at least three fixing through-bores, which may vary from four, five, six to ten bores, ~~and the~~. The set of bores ~~offor the vehicles in~~ each assembly plant may ~~have~~~~present~~ different diameters.

According to a preferred embodiment shown in Figure 5, the present invention ~~includes~~~~comprises~~ a wheel 10, preferably stamped from steel, which ~~has~~~~comprises~~ a substantially cylindrical wheel rim 11 and a substantially circular wheel disc 3. The wheel disc 3 and the wheel rim 11 are associated to each other, preferably by welding, but any other means may be used.

The wheel disc 3 ~~includes~~~~comprises~~ a substantially circular central portion 1 ~~that, which~~ defines a region for accommodating a wheel hub. Preferably, the accommodating region configures a central bore 1a, which may be a projection facing outwardly that defines ~~outwards and defining~~ a cavity for accommodating ~~the~~ tip of an axle or ~~else~~have any other configuration. ~~At~~~~Around the accommodating region,~~ at least six fixing through-bores 2 and, 2' ~~are,~~ a concentrically arranged around the accommodating region. Preferably ~~Also~~ preferably, the bores 2 and 2' are located in the central portion 1, but ~~there may be wheels on which these~~ the bores 2 and 2' can ~~be~~ located more outwardly and, closer to the wheel rim 11 on some wheels. The bores 2 and 2' are, ~~but~~ always concentric, and ~~concentrically~~. ~~It should be noted that the fixing bores 2 and 2' are preferably formed during the process of stamping the wheel, but they may be made by any other manufacturing processes.~~

The bores 2 and 2' are arranged around the central bore 1a, or an equivalent one, configuring at least a first set of bores and a second ~~sets~~ set of bores that define two imaginary circumferences with different concentric diameters 2a and, 2b ~~concentric~~



~~therewith.~~ Preferably, each set of bores is formed by four different bores 2 and 2' having first and second diameters 2a and 2b, preferably of 100 mm and 98 mm, respectively. ~~Evidently the sets~~ The number of bores in each set of bores may vary in the number of bores they have, depending upon the ~~amount~~ number of fixing means existing on the wheel hub, as for example, fixing screws or studs, which will fix the wheel to the wheel hub through ~~these the~~ bores 2 and 2'.

As already mentioned, each set of bores 2 and 2' has a diameter 2a or 2b that is different from the diameter of the other set of bores, so that the wheel 10 disclosed herein can be used on vehicles having a wheel hub with ~~respective diameter values~~ different diameters.

Thus, if the user buys a set of wheels 10 according to the present invention for his ~~car~~ vehicle, but intends to change ~~it the vehicle~~ within a ~~given~~ given period of time and wishes to keep the wheels 10, ~~since they have two sets of bores with different diameters 2a, 2b,~~ he may ~~therefore use them~~ the wheels 10 on the new vehicle since the wheels 10 have two sets of bores 2 and 2' with different diameters 2a and 2b, in case providing there is compatibility with regard to the number of bores 2 and 2' and the diameters 2a and 2b.

Following the same concept, a second and a third preferred embodiments of the present invention are ~~foreseen, as can be seen~~ shown in ~~figures~~ Figures 7 and 8, respectively. In these embodiments of the wheel 10, the bores 2 and 2' of one set of bores are open and the bores 2 and 2' of the other set of bores are closed with covers 5, which may preferably be removed if they are used on another vehicle. This embodiment of the present wheel 10 equips vehicles as an original component from the factory. The covers 5 also help the user to remove/replace the wheel 10 onto the vehicle during ~~the maintenance service~~, since the four bores 2 and 2' that he will use ~~remain are~~ are uncovered, and the four other bores 2 and 2' remain hidden, ~~thus preventing~~ the wheel 10 from being wrongly ~~fixed or assembled and~~ preventing confusion. Further, if the user decides to use the wheel 10 on a vehicle compatible with the set of bores 2 and 2' stamped in it, he may reposition the covers 5 ~~adequately~~ as needed. The covers 5 are preferably secured by pressure, but they may be fixed onto the wheel 10 by any other means.

In the ~~exemplification example~~ of the GM/FIAT ~~group~~ vehicles, the solution of using for different sets of bores ~~between~~ 2 and 2' for the vehicles from the two assembly plants ~~would be achieved, since this~~ is possible. The FIAT ~~cars~~ vehicles have a 98 mm

(~~millimeters~~millimeters) diameter configuration of the bores around the central portion 1 of the wheel disc 3, and ~~those from the~~ GM vehicles have a 100 mm (~~millimeters~~millimeters) configuration, which are defined by the respective factory projects. ~~The group may purchase~~ A single model of wheel 10 can be purchased and equip both the vehicles indistinctly can be equipped with the a wheel 10 provided with two bore 2 and 2' configurations. ~~The configuration, and also provide a vehicle with has wheels having, for instance, the 10 with a set of bores of for the FIAT vehicle, and the a hidden set of bores for use on the GM vehicles, thus bringing about the sought after scale economy providing an economy of scale.~~

~~Determined~~The wheel hubs might presenthub can include a guiding pin for to help position~~optimizing the work of positioning the wheel 10 in place, and the guiding pin which fits into a bore 9 existing in the adequate or compatible wheels from the prior art. In the case of the wheel of the present invention, the~~The guiding pin wouldcan be accommodated in one of the bores 2 and 2' of the other set of bores existing in the wheel 10.

As already mentioned, ~~for the large conglomerates that companies have various marks vehicles in their production lines, and the wheels 10 of the present invention makes it described herein are advantageous, since it is possible to provide them with different bore diameters 2a and 2b, with two or more sets of bores 2 and 2', but concordant with the marks vehicles of the conglomerate, bringing about economy company. This provides economies of scale, rapid rapidity in production and reduction of the, a reduced numbers of processes of for manufacturing the various models of wheel, as well as reduction of and a reduced stock.~~

Another advantage for these ~~conglomerates companies~~ is the optimization of assembly cells, which ~~comprise include~~ a small assembly line within a general vehicle-production line. ~~In the case of the wheels, the~~The vehicle assembly company ~~make available to the~~provides a wheel supplier a space within the factory. In this way, theThe wheel supplier is associated with the tire supplier and, in a joint process, ~~makes available the they make a wheel-tire assembly available which is, already assembled, balanced and, calibrated and, ready for mounting onto the vehicle, thus getting rid the.~~ This reduces the number of issues relating to ~~assembly vehicle company of further concerns.~~

The wheel 10 of the present invention ~~brings the following~~provides many advantages for the vehicle assembly company and for the supplying company, ~~among numberless others:~~

— For one, ~~reduction of the area of the assembly cells is reduced because there are a fewer number of, since the different types of wheel that will be assembled drastically decrease wheels, entailing an increase in~~ increasing the useful space of the assembly plant. Additionally, ~~the assembly plant does not have to worry~~ has fewer concerns about the mistakes of delivery, or mistakes and with the type of wheel received, since because the wheel may be used on various models of vehicle. The ; optimization of the work at the head office of the wheel supplier, which can maintain only needs to fulfill one shipment of wheels 10 for various assembly plants, without having to worry worrying about separating various types of wheel wheels, thus saving on transport for the various models that would have to be delivered, therefore reducing work. As; as already mentioned, because only one type of wheel 10 is being delivered, there is a the reduction or the occurrence of mistake in the delivery mistakes because, due to the fact of only one type of wheel 10 is provided. Therefore, the wheel supplier can focus on, whereby one will be concerned only with the number of orders from each assembly plant. The ; reduction of the cost of manufacturing the wheel 10, by virtue is also reduced because of the scale economy economies of scale.

~~In order to~~ To fix the wheel 10 of the ~~present invention~~ onto the wheel hub of the vehicle, ~~it is enough to position it~~ the wheel is positioned with the set of bores that are adequate for the vehicle involved and ~~to tighten the screws or other fixing elements are tightened.~~ There is no need for using any type of adapter or any other additional element, and the procedure being is identical to that the procedure used in the case of the conventional wheel. ~~This means that the~~ The fixing elements associate the wheel directly with the wheel hub without ~~the need for~~ needing adapters or other elements.

A preferred embodiment of the invention having been described, one should understand that the scope of the present invention embraces other possible variations, being limited only by the contents of the accompanying claims, which include the possible equivalents.

These and other features of the present invention can be best understood from the following specification and drawings, the following of which is a brief description. Although a preferred embodiment of this invention has been disclosed, a worker of ordinary skill in this art would recognize that certain modifications would come within the scope of this invention.

For that reason, the following claims should be studied to determine the true scope and content of this invention.

The foregoing description is only exemplary of the principles of the invention. Many modifications and variations are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced otherwise than using the example embodiments which have been specifically described. For that reason the following claims should be studied to determine the true scope and content of this invention.